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14 February 1958

MEMORANDUM FOR: Project Director

SUBJECT : Requirement for Geodetic Accuracy

1. In order to utilize ballistic missiles, both of intermediate range and of intercontinental range, the Air Force requires knowledge of the location both of the launch site and of the ground zero on the World Datum. The characteristics of the first generation of such missiles are such that if the error in locating these points relative to each other is 25X1 greater than [redacted] additional missiles must be launched at the targets in order to give an acceptable probability of damage. There is, therefore, a requirement to be able to position all war plan targets with respect to missile launch sites with an error not greater than [redacted] 25X1

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2. Until very recently, the geodetic data available to the United 25X1 States were such that errors in excess [redacted] were to be expected 25X1 [redacted] In the greater part of this area, the errors ranged between [redacted] In fact, today the finished geodetic 25X1 information available to us still contains errors of this order of magnitude. 25X1

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3. As a result of this situation, the Air Force undertook to 25X1 determine methods whereby these errors could be reduced. In carrying out this project, some [redacted] locations [redacted] exclusive 25X1 [redacted] an additional [redacted] locations [redacted] were 25X1 secured. It has been determined by the Georgetown Observatory, and independently by the Astrophysical Observatory of the Smithsonian Institution and the Aeronautical Chart and Information Center, that 25X1 these positions can generally be referenced mathematically to the World Datum with an order of accuracy of [redacted]

4. These positions are not of significance to us unless they can be related to targets in our current and future war plans.

[redacted] 25X1

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5. There are two ways by which the required relationship can be established, and each way requires the use of aerial photography:

a. When the target lies in an area which is covered by photography, and one or more of the position points is covered by the same photograph, the location of the target can readily be determined with respect to the position points and can therefrom be computed to the World Datum.

b. When the target does not lie in an area immediately adjacent to one of the position points, but a line of photography can be obtained which covers both the target and some of the position points, then the target can be referenced to the position points by photogrammetric triangulation, and thence reduced mathematically to the World Datum.

6. In each of the instances above, the reduction of the target to the World Datum can, more often than not, be within the required accuracy limit. In addition, it appears that in the case of photogrammetric triangulation the line of photography can be [redacted] or longer, and providing that each end of the line of photography contains position points, then a target in the center of the line of photography can be located to within the [redacted]
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7. In order, then, to be able to have a reasonable probability of destroying war plan targets with ballistic missiles without launching large numbers of missiles at each target, the Air Force will have a requirement for lines of photography of various lengths between certain cities which will be named later. The cities which will be named will be determined by the existence of one or more of the previously mentioned position points which can readily be identified within the city. These lines of photography will be so designated as to pass over war plan targets whose positions must be fixed with respect to the World Datum.

8. In many, if not most, instances, the required lines of photography could be acquired not at the expense of coverage of important intelligence objectives but in addition to such coverage. This could be accomplished by modifying routing in such a way as to accomplish the lines of photography en route to or from the intelligence objectives.

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9. It is our understanding that changes in operational procedure are currently under way which would facilitate the exploitation for purposes of geodetic positioning of coverage now in our hands as well as facilitating exploitation of new coverage. These changes in summary are as follows:

a. Camera calibration, which would permit a more precise photogrammetric analysis. (These data have not heretofore been available.)

b. Determination of exterior geometry, which would provide more precise information with regard to camera geometry inter-relationships.

These innovations will permit a fuller exploitation of the photography by raising the inherent capability of the systems from that of a reconnaissance to a metrical level.

10. Inasmuch as the control points tend to cluster about lines of communication, some of which are of current interest in connection with requirements on mobile IRBM and ICBM launch sites, it is anticipated that there may well be collection of great use in geodetic positioning as a result of coverage of highest priority targets in weather areas in western USSR. Accordingly, at this time no recommendation is made to the Project for taking into account requirements for geodetic positioning in that area of the USSR.

11. However, it would be highly desirable for Operations' planning [redacted] 25X1
Air Force Target Materials Production will, as rapidly as feasible, make available 25X1
to the Intelligence Officer of the Project control points in weather Areas [redacted] inclusive with most immediate attention on [redacted] 25X1
25X1 Control points in weather Areas [redacted] will be examined by HTAUTOMAT in terms of existing coverage before being forwarded to Operations.

12. Note is taken of the fact that as the Air Force Targeting Program in connection with geodetic positioning gets under way there are dangers of duplication with work being accomplished or planned at HTAUTOMAT and that work accomplished at HTAUTOMAT can be of

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use to the Air Force program. Accordingly, it has been suggested that these two organizations consult and lay their plans so as to minimize duplication and obtain the greatest benefits from their respective efforts.

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JAMES Q. REBER
Chairman
Ad Hoc Requirements Committee

JQR:Cw

1-Project Director
2-OACSI
3-ONI
4-AFCIN
5-AFCIN-Z
6-NSA
7-State
8-Asst to DD/I(P)
9-OCI
10-OSI
11-ESOOSI
12-ORR
13-IO
14-Cf/HTA
15-TSO
16-PSO
17-DD/P
18-HTA/OCR
19-file
20-chrono

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